THE HOLOTYPE OF THE WEALDEN CONIFER *BRACHYPHYLLUM PUNCTATUM* MICHAEL

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ABSTRACT. The missing holotype of the conifer *Brachyphyllum punctatum* Michael originally described from the Wealden of Germany has been rediscovered. *B. castatum* Watson, Fisher and Hall from the English Wealden has proved to be synonymous with *B. punctatum*. *Tarphyderma glabra* Archangelsky and Taylor from the Lower Cretaceous of Argentina is probably also specifically identical.

THE single well-preserved conifer shoot used by Michael (1936) to establish the species *Brachyphyllum punctatum* was part of a small collection originally housed in the Geological Survey of Berlin. Since 1961 enquiries and searches made in Berlin and elsewhere had failed to locate any of her hand specimens or preparations. It was thus thought likely that they were lost along with many of the nineteenth-century Wealden type and figured specimens, and several conifer species in the English Wealden flora have subsequently been described without the benefit of comparison with similar German material. Watson, Fisher and Hall (1987) discussed the unusual and uncertain nature of *B. punctatum* and its possible synonymy with their new English species but from Michael's figures alone were unable to draw any satisfactory conclusions. However, the holotype of *B. punctatum* has now quite unexpectedly been found lying unrecognized amongst a collection of unfigured material in the Geologisch-Paläontologisches Institut and Museum of the Georg-August-Universität, Göttingen. Though it had no registration number it was easily recognizable as Michael's original. Study of its cuticle shows it not only to be identical to the English material of Watson *et al.* (1987) but probably also to a newly erected species from the Lower Cretaceous of Argentina (Archangelsky and Taylor 1986).

SYSTEMATIC PALAEONTOLOGY

Brachyphyllum punctatum Michael, 1936

Plate 92, figs. 1–6

1936 *Brachyphyllum punctatum* Michael, p. 60, pl. 3, figs. 7 and 8; pl. 4, figs. 2 and 3.
1976 34 CONIF BrA; Oldham, p. 466, pl. 75, figs. 1–8 (code number used in place of Linnean name).
1987 *Brachyphyllum castatum* Watson, Fisher and Hall, p. 169, pl. 1, figs. 1–5; pl. 2, figs. 1–8; pl. 3, figs. 1–6; pl. 4, figs. 1–8; pl. 5, figs. 1–7; pl. 6, figs. 1–6; text-fig. 1A–D; text-fig. 2A–D.

The following is probably also synonymous:

1986 *Tarphyderma glabra* Archangelsky and Taylor, p. 1578, figs. 1–30.

Material and age. Specimen 53.1.4 from Egestorf, Deister: Berriasian.

Description. The holotype, shown at natural size in Plate 92, fig. 1, is of similar dimensions and morphology to the shoot figured by Watson *et al.* (1987) in their plate 1, fig. 3. The formula devised for us by Dr Alan Charlton (see appendix in Watson *et al.* 1987) for determining phyllotaxis has given parastichy numbers of 5+8 which agrees with British Museum (Natural History) specimen V.2321. The cuticle is of the type having moderately long stomatal tubes (Pl. 92, fig. 2) and has the enigmatic 'thick cells' which permit the instant recognition of this species in the light microscope. Unfortunately we have yet again been unable to demonstrate these cells satisfactorily in the SEM. Plate 92, fig. 6 is the inner surface of the adaxial cuticle showing the typical elongated cells with strongly cutinized, pitted inner periclinal walls. The convoluted cuticle lining the

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stomatal tubes in several English specimens has not been seen in the holotype. However, this is a variable feature by no means always present. It is not present in the English specimens with the longest tubes but is seen in the Argentinian material which has equally long tubes.

DISCUSSION

Watson *et al.* (1987) have discussed Michael's description of the cuticle of *B. punctatum* which they eventually concluded must be different from the English material in having the outer surface 'covered by a thick, densely arranged hair-like tomentum' (translation of Michael 1936 by Dr H. Jähnichen). Michael sectioned a leaf and her photograph of this (Michael 1936, pl. 3, fig. 8) shows these protuberances quite clearly with no question of the cuticle having been inadvertently reversed. We are now able to demonstrate that her description was indeed a misinterpretation, caused by unusual preservation of the holotype cuticle. Plate 92, fig. 3 shows the outer surface of the abaxial cuticle, intact on the right-hand side but with all the cutinized outer periclinal walls missing on the left-hand side. Plate 92, fig. 4 shows a close-up of the junction between these two areas. It now seems clear that the leaf sectioned by Michael must have had the outer walls of the epidermal cells missing. Plate 92, fig. 5 shows the vertically cut edge of such a piece of cuticle, at high tilt in the SEM with the outer surface uppermost. Sections of this would certainly give the appearance of strong surface protuberances.

The Argentinian material is so far known only as large leaves with the longest stomatal tubes. There seems to us no doubt about it being *B. punctatum* but there is a puzzling difference in the form of the cells of the adaxial surface of the leaf. The adaxial cuticle of the English material shows elongate cells of a very distinctive and consistent form, indistinguishable from Michael's plate 4, fig. 2. Archangelsky and Taylor (1986, fig. 2) figure polygonal adaxial cells with thick walls. We have seen nothing like them in the European specimens although the holotype does have much shorter cells in places. Archangelsky and Taylor in their diagnosis mention 'sometimes elongate cells with straight walls' but they are not figured. This discrepancy should be studied further before the diagnosis for the species is emended.

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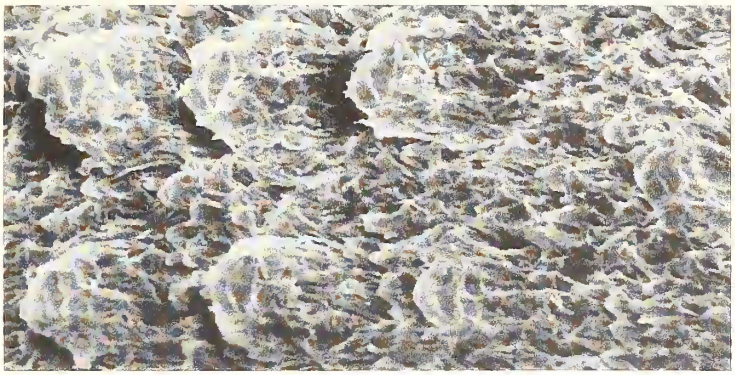
EXPLANATION OF PLATE 92

Figs. 1–6. *Brachyphyllum punctatum* Michael. 2–6 are scanning electron micrographs. All 53.1.4 the holotype. 1, leafy shoot, ×1. 2, inside of abaxial cuticle showing stomatal tubes, ×150. 3, outside of abaxial cuticle; surface intact on right-hand side, outer periclinal walls missing from all cells on left-hand side, ×150. 4, close up of junction between two areas in fig. 3, ×400. 5, cut edge of abaxial cuticle at high tilt showing anticlinal walls, outer surface, lacking periclinal walls, uppermost, ×400. 6, inside of adaxial cuticle, ×400.

1



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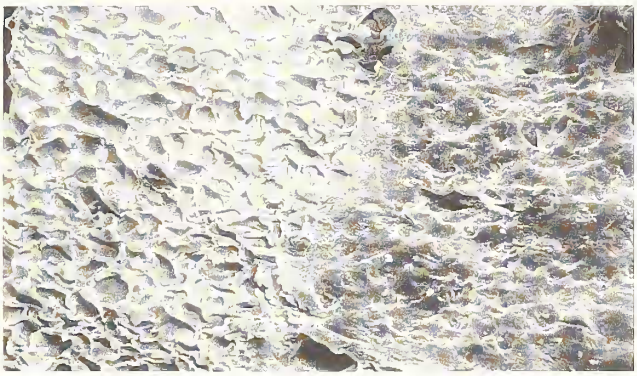

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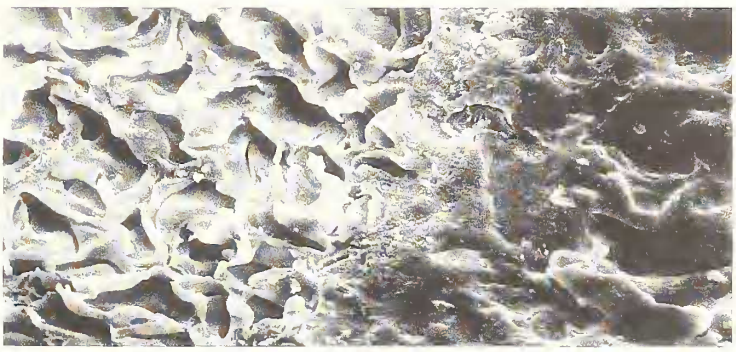

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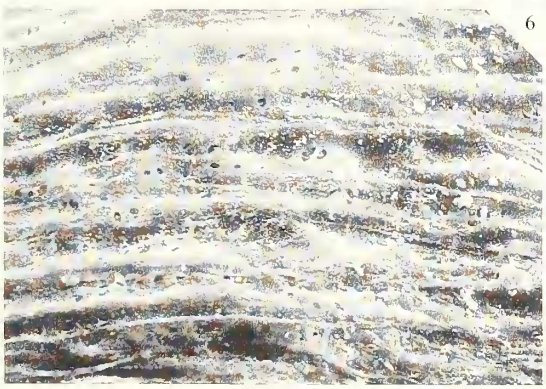

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5

WATSON, FISHER and HALL, *Brachyphyllum punctatum*